

UNITED STATES PATENT OFFICE.

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VEHICLE.

SPECIFICATION forming part of Letters Patent No. 772,198, dated October 11, 1904.

Application filed June 16, 1904. Serial No. 212,796. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH A. WILLIAMS, a citizen of the United States, and a resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and Improved Vehicle, of which the following is a full, clear, and exact description.

My invention relates to vehicles, and more particularly to the axle of those of the motor-driven type.

Its principal objects are to provide a simple and durable arrangement whereby the driving power may be applied to the axle of the steering-wheels.

With such ends in view my invention consists in the various features and combinations hereinafter described, and more particularly claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is an end elevation of a portion of a vehicle embodying one form of my invention. Fig. 2 is a partial horizontal section therethrough on the line 2 2 of Fig. 1. Fig. 3 is a broken vertical sectional detail through the connection between the casing and one of the supporting-arms. Fig. 4 shows the relation between the ball upon the end of the axle and the coacting pins in the hub for one position of the elements. Fig. 5 is a section therethrough on the line 5 5 of Fig. 4, and Figs. 6 and 7 are similar views with the ball and pins in another position.

The numerals 10 10 designate longitudinal stays of a vehicle-frame, each of which carries upon its forward end a head or T-casting 11, in which is secured a sleeve 12. These two sleeves are in alinement, and in each of them is journaled a shaft or axle 13, having at their adjacent ends elements of a differential gearing 14 of any convenient type, here shown as driven by a chain 15, extending from the motor or source of power. At the outer end of each axle is a spherical connecting member or ball 16, which coacts with a socket formed in a hub comprising an inner section 17 and an outer section 18, separably connected by longitudinal screws 19. Upon each

hub is mounted a wheel 20, the spokes 20^a of which radiate from a sleeve 20^b, which may be keyed to the hub by screws 21, threaded into the openings comprised in both members.

To compel the rotation of the wheels with the axles, each ball is provided with a series of grooves 22, the longitudinal axes of which are in alinement with the axle. Into these grooves extend pins or projections 23, fixed to the hub and allowing the wheel to rock or swing upon the axle, while constraining it to rotate therewith. To permit this rocking to occur in a horizontal plane to enable the vehicle to be steered while preventing the wheels from wobbling or displacement in a vertical plane, a guide member is provided for each wheel, here shown as an annular casing 24, carried by opposite arms 25, extending from the T member 11, at the outer end of the sleeve. In each casing is an annular groove, preferably formed between opposite ball-races 26 26, threaded into the casing and retained in place by threaded collars 28. These races guide suitable balls or similar antifriction members 28^a, which contact with opposite sides of an enlargement 29, extending about the periphery of an annular flange or projection 30, here shown as formed integrally with the hub and flaring therefrom. The mounting of the casing upon the arms is preferably provided through slots 30^a, extending through elongated portions 30^b at the outer ends of the arms, which contact with flattened areas 30^c at the opposite sides of the casing, these slots having the form of arcs of circles struck from the vertical axis of the ball 16. With each of these slots coöperates a pin or projection P, having a threaded end 31, engaging a threaded opening in the casing, a cylindrical portion 32 lying within the slot and a head 33 situated outside the arm. It will be seen that this mounting resists the lateral movement of the wheel in a vertical plane or about a horizontal axis while permitting it to swing horizontally or about a vertical axis to exercise the steering function.

From a consideration of Figs. 4 to 7 of the drawings it will be seen that if the grooves 22 were of the same width throughout they would permit the steering movement of the